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DIVISION 02 - SITE WORK

SECTION 02145

WICK DRAINS

03/02

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SECTION 02145

WICK DRAINS
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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS(ASTM)

ASTM D 638	Standard Test Method for Tensile Properties of Plastics
ASTM D 774	Test for Bursting Strength of Paper
ASTM D 792	Standard Test Method For Density & Specific Gravity (Relative Density) Of Plastics By Displacement
ASTM D 3884	Standard Test Methods for Abrasion Resistance of Textile Fabrics
ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	Standard Test Methods for Breaking Load and Elongation of Geotextiles (Grab Method)
ASTM D 4716	Test Method for Constant Head Hydraulic Tranmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products
ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile
ASTM D 4833	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 5199	Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes

AMERICAN PUBLIC WORKS ASSOCIATION

300-3.5.2	Standard Specifications for Public Works Construction, 1997 Edition

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office, that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Data; G

Manufacturer's literature documenting the physical and mechanical properties of the drain (as a minimum those properties required by the specifications).

SD-07 Certificates

Certificates; G

Retain a supplier's purchase certificate to verify the type and physical characteristics of the drain actually installed.

Sequence and Method of Installation; G

Details of the sequence and method of installation. The submittal shall, at a minimum, contain the following specific information:

1. Size, type, weight, maximum pushing force, vibratory hammer rated energy, configuration of the installation rig and barge used for underwater installation
2. Dimensions and length of mandrel
3. Details of wick drain anchorage
4. Detailed description of proposed installation procedures
5. Proposed methods for splicing drains
6. Three 2-foot samples of materials
7. Survey of existing piles
8. Wick drain layout drawing showing location of wick drain and existing piles

Wick Drain Installation Schedule;G

Products to be installed

State which wick drain products are to be installed at the time of the submission with tender.

Qualifications

Installer Qualification per this Specification

SD-04 Samples

Material samples

For both land based and underwater installations, submit a sample of the unspliced wick drain to be used, and three samples of proposed splices, with the accompanying manufacture specifications of the wick drain material prior to the installation of drains. The sample of the unspliced drain shall be at least 5 feet long. Samples of spliced wick drain shall be long enough to include the splice plus 2 feet of unspliced drain on both sides of the splice. The samples shall be stamped or labeled by the manufacturer as being representative of the drain material having its specified trade name.

For both land based and underwater installation, submit samples of gravel drainage blanket material. Sample shall be between 10 and 20 pounds.

1.3 WORK INCLUDED

WICK DRAINS consists of furnishing labor, equipment, materials, and transportation for the installation of vertical prefabricated wick drains. The drains shall consist of a band-shaped plastic core enclosed in a jacket material. The wicks require both land and underwater installation and shall be installed at locations shown on the Drawings or as directed by the Contracting Officer.

1.4 GEOTECHNICAL EVALUATION

A Geotechnical Report entitled "Draft Dike & Landfill Report", dated March 19 2002, has been made for the site by Earth Mechanics, Inc. The soil boring logs are included in this report. The over-water boring logs referenced within this report are available from Fugro reports tabulated in Section 02020 of these specifications. The Earth Mechanics report may be reviewed within the offices of the Los Angeles District Corps of Engineers.

1.5 QUALITY CONTROL

A. Approval of wick installation equipment and wick drain material by the Contracting Officer will not relieve the Contractor of the responsibility to install drainage wicks correctly. If, at any time, the Contracting Officer considers that the method of installation does not produce a satisfactory drain, the Contractor shall alter the method and equipment necessary to comply.

B. Approval of the sample material by the Contracting Officer shall be obtained by the Contractor prior to site delivery of the wick drain material.

C. The drains shall be free of defects, rips, holes or flaws. During shipment and storage, the drains shall be wrapped in a protective covering.

The drains shall be protected from sunlight, mud, dirt, dust, debris, and detrimental substances during shipping and on-site storage.

D. The Contractor shall certify and provide proof to the Contracting Officer of experience in the work described.

PART 2 PRODUCTS

2.1 WICK DRAINS

Submit Manufacturer's Data, a minimum of 14 days before the start of construction.

Submit Certificates, within 14 days after purchase of the wicks.

Submit Products to be installed, within 14 days after purchase of the wicks.

Submit Qualifications, a minimum of 14 days before the installation

Submit Material samples

2.1.1 Prefabricated Wick Drain

The prefabricated wick drain shall consist of a continuous plastic drainage core wrapped in a nonwoven geotextile material jacket. The jacket shall allow free passage of pore water to the core without loss of soil material or piping. The core shall provide continuous vertical drainage. The prefabricated wick drain material shall meet the following specifications:

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR PREFABRICATED WICK DRAIN

PROPERTY	ACCEPTABLE VALUES	TEST METHOD
Minimum thickness:	1/8" (3.2mm)	ASTM D 5199
Minimum width:	3.9" (100 mm)	ASTM D 5199
Tensile strength:	0.9kN(200 lb) at elongation minimum 2 percent, maximum 10 percent	ASTM D 638
Discharge capacity	20x10-6m3/s (7x10-4 ft3/sec) at 350 kN/m2 (7,310 lbf/ft2) soil pressure after 4 weeks	ASTM D 4716
Discharge capacity at deformation:	10x10-6 m3/s (3.5x10-4 ft 3/sec) at 25 percent relative compression	ASTM D 4716

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR PREFABRICATED WICK DRAIN

PROPERTY	ACCEPTABLE VALUES	TEST METHOD
Apparent opening size, fabric:	U.S. size no. 200-270	ASTM D 4751
Water Permeability (K-value), fabric:	10-4 m/s (3.28x10-4 ft/s)	ASTM D 4491
Tear Strength, fabric:	40 Newtons (9 lb)	ASTM D 4533
Tensile Strength, fabric:	250 Newtons (56 lb)	ASTM D 4632
Elongation at break:	50%	ASTM D 4632
Modulus:	1,350 Newtons (300 lb) at 10% Elongation	ASTM D 4632
Puncture strength, fabric	15 lb	ASTM D 4833
Mullen burst, fabric:	30 psi	ASTM D 774
Abrasion resistance, fabric:	42 lb	ASTM D 3884
Specific gravity, fabric:	0.80	ASTM D 792
Flux, fabric:	50 gal/ft2/min	ASTM D 4491

2.1.2 Jacket and Core

The jacket and core components shall conform to the following:

1. The jacket shall be synthetic non-woven geotextile capable of resisting bending, punching and tensile forces imposed during installation and during the design life of the drain.

2. The jacket material shall not be subject to localized damage (e.g., punching through the filter by sand/gravel particles).

3. The jacket material shall be rigid enough to withstand lateral earth pressures due to embedment and surcharge so that the vertical flow capacity through the core will not be adversely affected.

4. The jacket material shall be flexible enough to bend smoothly during installation and induced consolidation settlement without damage.

5. Jacket material shall not undergo cracking and peeling during installation of the drain.

6. The core shall be continuous plastic material fabricated to promote drainage along the axis of the vertical drain.

7. The mechanical properties (strength and modulus) of the assembled wick drain shall equal or exceed those specified for the component jacket and core.

8. The assembled drain shall be resistant against wet rot, mildew, bacterial action, insects, salts in solution in the ground-water, acids, alkalis, solvents, and other ingredients in the site groundwater.

2.1.3 Materials Identification

Wick drain materials shall be labeled or tagged in such a manner that the information for sample identification and other quality control purposes can be read from the label. As a minimum, each roll shall be identified by the manufacturer as to lot or control numbers, individual roll number, date of manufacture, manufacturer and product identification of the jacket and core.

2.1.4 Damaged Materials

Material which is damaged during shipment, unloading, storage, or handling or which does not meet the requirements of the drain material will be rejected by the Contracting Officer and immediately removed from the project site. No payment of any kind will be made for rejected material.

2.2 Gravel Drainage Blanket

Gravel drainage blanket for both land-based and underwater wick drains installation shall meet the specifications for Pervious Backfill per American Public Works Association Greenbook, Section 300-3.5.2.

PART 3 EXECUTION

Submit Sequence and Method of Installation, a minimum of 14 days before the installation

Submit Wick Drain Installation Schedule, a minimum of 14 days before the installation

3.1 CONSTRUCTION INSTALLATION

A. Where shown on the Drawings or as directed by the Contracting Officer, wick drains shall be installed with equipment which will cause minimum disturbance of the subsoil during installation operation and maintain the mandrel in a vertical position. The prefabricated drains shall be installed using a mandrel or sleeve that will be advanced through the gravel drainage pad and soils to the required depth. The mandrel or sleeve shall protect the drain material from tears, cuts, and abrasion during installation, and shall be retracted after each drain is installed. The mandrel or sleeve shall be sufficiently stiff to prevent wobble or

deflection during installation.

B. The Wick drains are to be installed also in the location of the side transfer platform structure of the former Todd Shipyard. Numerous concrete piles are located in this area. Contractor shall demolish and remove the structure and the piles as shown on the drawings. Contractor shall survey location of existing piles prior to demolition and removal. In location where the piles interfere with the wick installation, Contractor shall displace the wick as shown on the drawings.

C. Constant load or constant rate of advancement methods shall be used. A vibrator may only be used when approved by the Contracting Officer in areas where constant load or constant rate of advancement methods cannot install the wicks to the design depths. The vibrator may not be used except in cases where design penetration cannot be achieved by using the full static push force available to the mandrel. Use of falling weight impact hammer will not be allowed.

D. The drain shall be provided with an "anchor" plate or similar arrangement at the bottom to anchor the bottom of the drain at the required depth during the mandrel removal and to prevent the soil from entering the bottom of the mandrel during drain installation. The corresponding dimension of the anchor shall conform as closely as possible to the breadth dimensions of the mandrel so as to minimize soil disturbance. The projected cross-sectional area of the mandrel and anchor combination shall not be greater than 14 square inches.

E. Prior to the installation of the production wick drains, the Contractor shall demonstrate that the equipment, method, and materials produce a satisfactory installation. For this purpose, the Contractor shall install (5 to 10) trial drains at up to 10 locations within the work area as designated by the Contracting Officer.

F. Land installed vertical wick drains will be located, numbered, and staked by the Contractor. The Contractor shall take precautions to preserve the stake locations, and is responsible for re-staking if necessary.

G. Drains that deviate from the Drawing locations by more than 6 inches, or that are damaged, or improperly installed will be rejected. Rejected drains may be removed or abandoned in place, at the Contractor's option. Replacement drains shall be placed as close as possible to the correct original location.

H. The Contractor shall provide the Contracting Officer with a means of verifying the plumbness of the mandrel. The equipment shall be checked for plumbness prior to installing each drain and shall not deviate from the vertical more than 0.25 inch per foot during installation.

I. Splices or connections in the vertical drain material shall be done in accordance with the manufacturer's instructions and in a manner to insure continuity of the wick material. Splicing of wick drain material shall be done by stapling so as to provide structural and hydraulic continuity of the drain. The jacket and core shall be overlapped a minimum of 6 inches.

J. Wick drains shall be installed from the working surface (top of gravel drainage blanket). The Contracting Officer may vary the depths, spacing or the number of wicks to be installed and may revise the Drawing limits for this work.

K. Wick shall be installed to the depth indicated on the Drawings.

L. The prefabricated drain shall be cut off neatly at least 4 inches above the top of drainage blanket or as otherwise specified on the Drawings.

M. During wick drain installation, the Contractor shall provide the Contracting Officer with a means of determining the depth of the advancing drain at any given time and the length of the drain installed at each location. A summary tabulation of the number and length (to nearest foot) of acceptable wicks shall be submitted daily to the Contracting Officer.

N. Where obstructions are encountered, the Contractor shall install a new drain within an 18-inch radius of the original location of the obstructed drain. A maximum of one additional attempt shall be made as directed by the Contracting Officer for each obstructed drain. If the drain still cannot be installed to the design tip elevation, the drain location shall be abandoned and a new drain installed at a location directed by the Contracting Officer. Locations where wicks do not meet the depth criteria due to obstructions shall be clearly marked in the field. The Contracting Officer shall have the right to waive the replacement wick drain requirement upon written notice to the Contractor.

O. The Contractor may use auguring, spudding, or other approved methods to loosen the soil and obstructing material prior to installation of the drains. The obstruction clearance procedure is subject to the approval of the Contracting Officer. However, such approval shall not relieve the Contractor of the responsibility to clear obstructions.

-- End of Section --